

REMARKS/ARGUMENTS

Declaration under 37 CFR 1.131

A new declaration is enclosed herewith, addressing all objections raised by the examiner in the Office Action of November 8, 2004.

Claim Rejections - 35 U.S.C. 112

The above amendment obviates the sole objection raised in the Office Action under this heading.

Claim Rejections - 35 U.S.C. 102 and 103

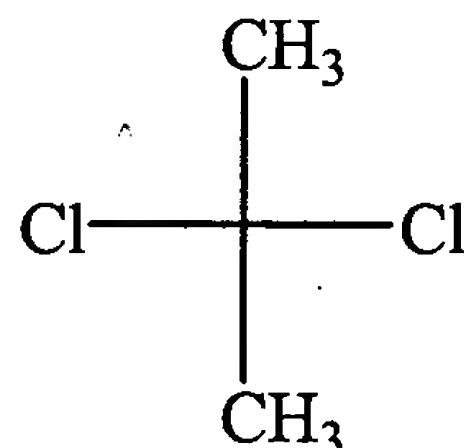
The rejections over Robbart US 4,554,215, both as a primary reference and as a secondary reference, are respectfully traversed. It is acknowledged that Robbart discloses dichlorodimethyl silane as one example of a silane for coating a substrate in the vapor phase. Nevertheless, Robbart does not disclose the limitations of the present invention and in fact teaches away from them, and for this reason neither anticipates nor renders obvious Applicants' invention as claimed. The explicit teaching of Robbart is to use *dry vapors* of the silane and to *avoid* moisture in the atmosphere during the procedure. See the abstract, line 2, and column 5, lines 3-8. Furthermore, the atmosphere that used in the process taught by Robbart is *air* rather than the non-oxidizing atmosphere that Applicants' invention is limited to. See the paragraph bridging columns 4 and 5, where Robbart explicitly states that the silane vapors are formed by bubbling air through liquid silane or a solution of the silane. The process recited in Applicants' claims is the *opposite* of that of Robbart in both respects, reciting in claim 1 both the presence of water vapor in the reaction environment and the performance of the deposition in a non-oxidizing atmosphere. This is not optimization of the conditions disclosed by Robbart, but is instead an operation *contrary* to the Robbart teachings. There is no suggestion in the Robbart disclosure that its recommendations could be ignored and opposite reaction conditions used and still achieve effective results. Accordingly, the present invention is neither anticipated nor obvious over the disclosure in Robbart.

All rejections citing Leung as a reference, both individually and in combination with other citations, are now fully obviated by the enclosed declaration which, as stated above, meets all requirements for antedating the disclosure of Leung et al. and removing Leung et al., as a reference.

Turning next to Sato et al., the fundamental distinction that differentiates Applicants' invention from the disclosure of this reference is that the primary focus of Sato et al. is a silane that is far removed structurally from the silanes recited in Applicants' claims. The Sato et al. silane is HMDS or hexamethyldisilazane, whose synonym is bis(trimethylsilyl)amine and whose formula is as follows:



Compare this with the dihalodialkyl silanes of Applicants' claims, of which a representative example, and the one closest to HMDS, is dichlorodimethylsilane whose formula is:



The Sato et al. silane (HMDS) has two Si atoms and one N atom in a single molecular structure, while Applicants' silane has only one Si atom and no N atoms. The other silanes covered by Applicants' claims are similar to that shown in that the methyl group is broadened to C₁-C₃ alkyl and the Cl atom is broadened to "halo." By itself, HMDS is too far removed from any Applicants' silanes to raise even *prima facie* obviousness. The only mention of dichlorodimethylsilane by Sato et al. is its inclusion in a list in column 12, with no supporting explanation of similarities or differences between it and any of the other silanes mentioned, much less advantages or disadvantages of its use. The wide variations in structure (some are amines, others not, some are disilanes, others not) do indeed cause differences, as any skilled chemist will know or expect.

The examiner places great emphasis on the phrase "Experiments showed that what has been discussed above with reference to HMDS applies to the other members of the group in substantially the same way." (Column 12, lines 43-46.) The standard of obviousness

however is to interpret prior art as it would be understood by those skilled in the art, and to require that prior art provide an enabling disclosure. In the art of silane chemistry, those skilled in the art, and indeed any organic chemist, knows and understands that the reactive behavior of compounds differs significantly when an amino group is added or removed, and when an alkyl group is substituted by a halogen atom or a halogen by an alkyl. Considering the fundamental structural differences between HMDS and dichlorodimethylsilane as well as any of the silanes of the class recited in Applicants' claims, the person skilled in the art will not be persuaded or convinced by the gratuitous statement "Experiments have showed ..." much less the characterization "in substantially the same way." The person skilled in the art would not find statements such as these to provide an enabling disclosure for dihalodialkylsilanes and would instead consider these statements at most to be an *invitation to investigate* (i.e., "obvious to try") silanes other than HMDS rather than a reliable prediction of how they would perform or what operating conditions would be effective when they are used. "Obvious to try" is not a standard of obviousness.


Aside from the lack in Sato et al. of an enabling disclosure for dihalodialkylsilanes, what Applicants were able to achieve in ten minutes at ambient temperature and a pressure of 1.5 torr, Sato et al. are only able to report that it took 20 hours to achieve at atmospheric pressure. This is the only actual data reported in the entire patent. The ranges that the patent recites in column 9 (lines 44-50) are indeed broader but they are no more suggestive of the results that Applicants have achieved. When a temperature range of 20-200°C is cited in combination with a reaction time range of 5-150 minutes and a pressure range of 10 torr and up, the skilled chemist would read this to understand that a temperature at the low end of the range would require a reaction time at the upper end, and likewise a pressure at the low end of its range would require a temperature or reaction time or both at their upper ends. Applicants have shown that effective results are obtained with a combination of low pressure, low temperature, and very short reaction time. This is contrary to expectations and would be considered a nonobvious discovery by those skilled in the art. The fact that Applicants demonstrate this with an entirely different compound confirms the patentability of the process when applied to that compound (or to a class of compounds narrowly defined to include that compound).

The secondary references Kim et al., Schnable et al., Arkles et al., and Robbart have all been reviewed and none supply sufficient information to fill the gaps in the disclosure of Sato et al. The process disclosed by Kim et al. is not performed in the vapor phase and thereby entails none of the process considerations that a vapor phase reaction must face. The material deposited in the Schnable et al. disclosure is a glass layer (i.e., SiO_2) which is deposited by reacting SiH_4 with O_2 . No halides or alkyl groups are involved. Both the reactants and the products are entirely distinct from those involved in the present invention, with properties and reactivities that differ considerably. The disclosure in Arkles et al. is even further removed, involving an iodosilane that contains at least three iodine atoms and no alkyl groups. Applicants acknowledge that they are claiming "halo" groups in their structure and iodo is encompassed by halo. Nevertheless, Arkles et al.'s inclusion of three iodo groups on one molecule and no alkyl groups removes the structure considerably from that of Applicants, and the Arkles et al. process is performed by reacting the triiodosilane with ammonia gas or other "reactant gases," which removes the disclosure even further from the scope of Applicants' claims. Collectively, these distinctions cause Arkles et al. to fall short of suggesting or rendering obvious Applicants' invention. The limiting features of the Robbart disclosure are addressed above and applicable here as well.

CONCLUSION

The discoveries that form the foundation of Applicants' invention are hardly "optimizations" of the prior art, since to the extent that they involve the same compounds, they are either contrary to the teachings of the references citing those compounds, utilizing operating conditions that the references distinctly say to avoid, or they achieve results that those skilled in the art with a working knowledge of chemical reactions would find to be contrary to expectations. For these reasons, Applicants submit that the invention as presently claimed is patentable, and that all claims recite allowable subject matter. Accordingly, reconsideration of the application is respectfully requested. As before, should any matters remain that can be resolved by a conference with Applicants' attorney, the examiner is encouraged to telephone the undersigned at 415-576-0200.

Respectfully submitted,


M. Henry Helnes
Reg. No. 28,219

TOWNSEND and TOWNSEND and CREW LLP
Two Embarcadero Center, Eighth Floor
San Francisco, California 94111-3834
Tel: 415-576-0200
Fax: 415-576-0300
MHH:mhh
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